

Evidence-base behind the long-term effectiveness of Preschool

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Many children enter school unprepared to succeed, and those initial gaps are difficult for schools to close. Fewer than half of low-income 5-year-old children enter school ready to learn, and some are up to two years behind their peers.ⁱ When schools fail to close gaps in performance as they progress through school, the results are poor academic performance, grade repetition, expensive remedial services, and high rates of school dropout.ⁱⁱ An analysis produced last year by Stanford's Sean Reardon shows that a district that can produce 1.1 years of growth in one year – or 5.5 years of growth in five years, the time period Reardon looks at -- will rank among the best in the country.ⁱⁱⁱ Extrapolate that out and a superstar district might produce 11 years of growth in 10 years – an optimistic assumption given the difficulty of sustaining that level of performance. What that means is that in any district other than these superstar districts, a cohort of children that is more than a year behind *at the end of second grade* will not be caught up by the end of high school.^{iv} It is much cheaper, and much more effective, to prevent those gaps from developing the first place by investing in school readiness initiatives like preschool and full-day kindergarten.^v

Key Data Points

- The early childhood period (birth to age 5) is a time of rapid brain development, with one million new connections forming every second. Early experiences play a large role in determining how brain connections are formed and in the “wiring” that becomes the foundation upon which all later learning is built.^{vi}
- The learning gap between advantaged and at-risk children exists as early as 9 months of age. At-risk children can start kindergarten as much as 18 months behind their peers. Many of these children never catch up, and are at an increased risk of dropping out of high school.^{vii}
- Despite the body of evidence supporting the brain science of the early years and the demonstrated impact of various early learning interventions, many children enter the schoolhouse doors at 5 or 6 years old unprepared for success. And those who arrive behind tend to stay behind.^{viii}
- Just half of Colorado 3- and 4-year old children are enrolled in preschool of any kind. The Colorado Preschool Program (CPP) only has capacity to serve 24 percent of 4-year-old children and eight percent of 3-year-old children in the state. The Colorado Department of Education estimates that more than 8,000 4-year-old children qualified for CPP but had no program available to them.^{ix,x}
- Nationwide, at age 4, enrollment in pre-K is about 65 percent for the lowest 40 percent of families by income and 90 percent for the highest income quintile. At age 3, when state pre-K is rarely provide, enrollment is only about 40 percent for low-income and moderate-income families while it is 80 percent for the top income quintile. Overall, the US ranks 32nd of 39 OECD countries for ECE enrollment (70 percent of Organization for Economic Cooperation (OECD) countries vs 30 percent in US).^{xi}

Supporting Evidence from Colorado and National Research

- National findings mirror year after year of annual analyses of Colorado's own state-funded pre-K program (the Colorado Preschool Program) which improves student performance on standards-based assessments, reduces the probability of being identified with a Significant Reading Deficiency under the READ Act, reduces early elementary grade retention, and increases graduation rates.^{xii}
- A recently published analysis of the most comprehensive, high quality experimental and quasi-experimental studies of the impact of early childhood education conducted between 1960 and 2016 found that, on average, participation in ECE leads to statistically significant reductions in **special education placement** (-8.1 percentage points), **grade retention** (-8.3 percentage points), and increases in high school **graduation rates** (+11.4 percentage points).^{xiii}
- In the Colorado Preschool Program, our 30-year-old, home-grown early childhood education program:

- Across the domains of social-emotional, physical, language, cognitive, literacy, and mathematics children make significant overall gains in learning and development.^{xiv}
- Significant Reading Deficiency rates (as identified under the READ Act) for CPP graduates are on average 5 percent lower compared to other at-risk children with no history of publicly funded preschool.^{xv}
- Consistently over time, CPP graduates are 33% less likely to be retained in the early grades.
- On the state Colorado Measures of Academic Success, the percentage of CPP graduates who meet or exceed expectations in any one subject area is typically higher than those who are at-risk and with no history of publicly funded preschool. These trends are seen as far out as 11th grade and statistically significant in nearly all subject areas.^{xvi}
- An analysis of graduation within four years of entering ninth grade found that children who participated in half- or full-day CPP were more likely to graduate with a high school diploma within four years when compared to children who did not participate in CPP who were equally at risk.^{xvii}

Appendix of Findings on High Quality Preschool

Large-scale public preschool programs can have substantial impacts on children's early learning.

- A recent analysis integrating evaluations of 84 preschool programs concluded that, on average, children gain about a third of a year of additional learning across language, reading, and math skills. At-scale preschool systems in Tulsa and Boston have produced larger gains of between a half and a full year of additional learning in reading and math. Benefits to children's social-emotional development and health have been documented in programs that focus intensively on these area.^{xviii}

Quality preschool education is a profitable investment.

- Rigorous efforts to estimate whether the economic benefits of early childhood education outweigh the costs of providing these educational opportunities indicate that they are a wise financial investment. Available benefit-cost estimates based on older, intensive interventions, such as the Perry Preschool Program, as well as contemporary, large-scale public preschool programs, such as the Chicago Child-Parent Centers and Tulsa's preschool program, range from three to seven dollars saved for every dollar spent.^{xix}

Quality preschool education can benefit all children.

- Research shows positive outcomes for middle-class children as well as disadvantaged children; typically developing children as well as children with special needs; and dual language learners as well as native speakers. Although early research focused only on programs for low-income children, more recent research focusing on universal preschool programs provides the opportunity to ask if preschool can benefit children from middle-income as well as low-income families. The evidence is clear that middle-class children can benefit substantially, and that benefits outweigh costs for children from middle-income as well as those from low-income families.^{xx}

High-quality early education can improve long-term health outcomes.

- A recent study looked at children who attended North Carolina's Abecedarian preschool program in the 1970s, and found lower rates of pre-hypertension for adults in their mid-30s, as well as lower risk of total coronary heart disease. In men, there were lower combinations of obesity and hypertension.^{xxi} This is part of a growing body of scientific evidence that hardship in early childhood has lifelong health implications. But it goes further than outlining the problem, offering evidence that a particular policy might prevent it. That policy is providing children with high-quality early childhood programs.^{xxii}
- See also: https://www.rwjf.org/en/library/research/2018/05/early-childhood-is-critical-to-health-equity.html?cid=xtw_rwjf_unpd_dte:20180612; <https://science.sciencemag.org/content/343/6178/1478.full>

Other State Preschool Program Studies

- **Oklahoma:** Studies of the Tulsa pre-K program have repeatedly shown substantial short-term gains in school readiness, including big gains in pre-reading and pre-math skills. A study of 8th grade students found some persistence of these gains over time, particularly for math test scores and not being held back in school.^{xxiii} By age 18 or 19, the pre-K program decreased the likelihood that black children were charged with a misdemeanor or felony crime.^{xxiv} In a different study of the Tulsa Head Start program, participants had higher state test scores

in math in 7th grade and were 31 percent less likely to be held back and 34 percent less likely to be chronically absent by 8th grade.^{xxv}

- **North Carolina:** North Carolina's Smart Start and NC Pre-K programs improved young children's reading and math skills in fifth grade. Children in counties that spent more per child were two months ahead in reading and 1.5 months ahead in math by fifth grade when compared with children in counties that spent less.^{xxvi}
- **Arkansas:** An evaluation of the Arkansas Better Chance program found that children who attended pre-K developed an extra four months worth of vocabulary knowledge, beyond the gains that would be expected as a child naturally ages. Pre-K attendance also resulted in 23 percent more correct answers on a literacy test and improved math scores. Benefits persisted through 2nd grade for literacy, language and math, and through 3rd grade for literacy. In addition, children who attended the program were less likely to be held back in school by the end of 3rd grade than those who didn't attend any pre-K.^{xxvii}
- **Georgia:** The Georgia Pre-K program had positive effects on children's early literacy skills, math skills and general knowledge. Poor children also had sustained benefits through elementary school in reading and English language arts, were less likely to be held back in school, and outperformed children who did not attend pre-K on some measures on 9th grade achievement.^{xxviii}
- **New Jersey:** An evaluation of New Jersey's pre-K program found that children who attended the program significantly outperformed similar children who did not attend and that these differences persist at least through 4th or 5th grade. In 4th or 5th grade children who had attended New Jersey pre-K for two years were three-quarters of an academic year ahead of their peers who did not attend in math and two-thirds of an academic year ahead in literacy. Pre-K also reduced the likelihood of being held back in school by 40 percent and the likelihood of receiving special education services by 31 percent.^{xxix}
- **Michigan:** Participants in Michigan's state pre-K, the Great Start Readiness Program, were held back in school 51 percent less often than non-participants and had a 35 percent increase in high school graduation rates.^{xxx}
- **Massachusetts:** Boston's pre-K program improved mathematics, literacy and language skills among participating children equivalent to seven months of additional learning, compared with children who did not attend.^{xxxi}

High-Quality Early Education Yields a Strong Return on Investment

- A well-respected, independent cost-benefit analysis of nearly 20 different studies of state and local pre-K programs showed that pre-K can return, on average, a "profit" (economic benefits minus costs) to society of more than \$34,000 for every child served.^{xxxii}
- Participants in quality early learning programs show substantial improvements on test scores early in life.^{xxxiii} In adulthood, these same students are more likely to complete high school, attend college, and even have better health outcomes.^{xxxiv} They are less likely to have been charged with a crime or become a teenage parent.^{xxxv} The returns from quality early care and education have been estimated to be 7 percent to 13 percent per year.^{xxxvi} Study after study highlights the long-term cost savings of investing in high quality early learning programs (see The Abecedarian Project,^{xxxvii} the High/Scope Perry Preschool study, etc.).^{xxxviii}
- For example, a recent analysis of the Chicago Child-Parent Center study estimated \$48,000 in benefits to the public per child from a half-day public preschool for at-risk children. Participants at age 20 were estimated to be more likely to have finished high school—and were less likely to have been held back, need remedial help or have been arrested. The estimated return on investment was \$7 for every dollar invested (National Institute for Early Education Research).^{xxxix} In addition, a recent research brief from Ready Nation summarizes the abundance of research illustrating both the short and long-term benefits investments in early childhood.^{xl} In short, high quality early care and education is a key component to addressing the challenges our schools face in preparing tomorrow's workforce for success.
- Additional consensus statements by a wide range of academics highlight the impact of pre-K and the conditions that support long-term gains in children's achievement:
 - <https://www.brookings.edu/research/puzzling-it-out-the-current-state-of-scientific-knowledge-on-pre-kindergarten-effects/>
 - <https://www.fcd-us.org/assets/2013/10/Evidence20Base20on20Preschool20Education20FINAL.pdf>
 - <https://sites.google.com/site/ececonsensusletter/>

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- ⁱ https://www.brookings.edu/wp-content/uploads/2016/06/0319_school_disadvantage_isaacs.pdf
- ⁱⁱ http://www.frbsf.org/community-development/files/CI_Summer2012_Reardon.pdf
- ⁱⁱⁱ <https://www.nytimes.com/interactive/2017/12/05/upshot/a-better-way-to-compare-public-schools.html>
- ^{iv} Elliot Regenstein, Draft Paper
- ^v <https://www.the74million.org/article/regenstein-early-learning-is-the-best-way-to-close-the-achievement-gap-5-reasons-districts-prefer-to-play-catch-up-instead/>
- ^{vi} Center on the Developing Child Harvard University (n.d.). Brain architecture <https://developingchild.harvard.edu/science/key-concepts/brain-architecture/>
- ^{vii} Barnett, W.S., Tarr, J.E., Lamy, C., & Frede, E.C. 2001. Fragile lives, shattered dreams: A report on implementation of preschool education in New Jersey's Abbott Districts. New Brunswick, NJ: National Institute for Early Education Research.
- ^{viii} <https://www.forbes.com/sites/nickmorrison/2016/11/30/by-the-time-they-start-school-for-some-children-its-already-too-late/#55a70864a21e>
- ^{ix} Barnett, W.S., Carolan, M.E., Squires, J.H., & Clarke Brown, K. (2015). The State of Preschool 2014: State Preschool Yearbook. New Brunswick, NJ: National Institute of Early Education Research.
- ^x http://nieer.org/wp-content/uploads/2017/05/Colorado_YB16.pdf
- ^{xi} Putnam, Robert. *Our Kids*.
- ^{xii} <https://www.cde.state.co.us/cpp/legreports>, <https://www.cde.state.co.us/cpp/2018legreport>
- ^{xiii} <http://journals.sagepub.com/stoken/default+domain/ycdsVk2Xu4vSV8gxECVS/full>
- ^{xiv} <https://www.cde.state.co.us/cpp/2018legreport>
- ^{xv} <https://www.cde.state.co.us/cpp/2018legreport>
- ^{xvi} <https://www.cde.state.co.us/cpp/2018legreport>
- ^{xvii} <https://www.cde.state.co.us/2019cappellegreport>
- ^{xviii} <https://www.fcd-us.org/the-evidence-base-on-preschool/>
- ^{xix} <https://www.fcd-us.org/the-evidence-base-on-preschool/>
- ^{xx} <https://www.fcd-us.org/the-evidence-base-on-preschool/>
- ^{xxi} <https://eyeonearlyeducation.com/2014/04/02/researchers-find-that-high-quality-early-education-programs-improve-long-term-health-outcomes/>;
- ^{xxii} <https://heckmanequation.org/resource/research-summary-abecedarian-health/>
- ^{xxiii} Gormley, W. T., Phillips, D., & Anderson, S. (2017). The effects of Tulsa's pre-K program on middle school student performance. *Journal of Policy Analysis and Management*. <http://onlinelibrary.wiley.com/doi/10.1002/pam.22023/abstract>
- ^{xxiv} Smith, A. (2015, September). The Long-Run Effects of Universal Pre-K on Criminal Activity. <http://www.sole-jole.org/16422.pdf>
- ^{xxv} Phillips, D. A., Gormley, W. T., Anderson, S., (2016, August). Do the positive effects of Tulsa's Head Start program persist through middle school? <http://www.documentcloud.org/documents/3023268-CROCUSPolicyBriefAugust2016-1.html>
- ^{xxvi} Dodge, K. A., Bai, Y., Ladd, H. F. & Muschkin, C. G. (2016). Impact of North Carolina's early childhood programs and policies on educational outcomes in elementary school. *Child Development*. <https://www.ncbi.nlm.nih.gov/pubmed/27859011>
- ^{xxvii} Jung, K., Barnett, W. S., Hustedt, J. T., Francis, J. (2013, May). Longitudinal effects of the Arkansas Better Chance Program: Findings from first through fourth grade. <http://nieer.org/wp-content/uploads/2016/08/Arkansas20Longitudinal20Report20May2013n.pdf>
- ^{xxviii} <http://www.onlineathens.com/article/20111104/NEWS/311049985>
- ^{xxix} Barnett, W. S., Jung, K., Youn, M., & Frede, E. C. (2013, March 20). Abbott Preschool Program longitudinal effects study: Fifth grade follow-up. New Brunswick, NJ: National Institute for Early Education Research. <http://nieer.org/research-report/201311apples205th20grade-pdf>
- ^{xxx} Michigan Great Start Readiness Program evaluation 2012: High school graduation and grade retention findings. Retrieved from <http://bridgemi.com/wp-content/uploads/2012/06/GSRP-evaluation-may-21-12.pdf>
- ^{xxxi} Weiland, C., & Yoshikawa, H. (2013). Impacts of a prekindergarten program on children's mathematics, language, literacy, executive function and emotional skills. *Child Development*. <http://onlinelibrary.wiley.com/doi/10.1111/cdev.12099/abstract>
- ^{xxxii} Washington State Institute for Public Policy. (2017). Benefit-cost results. <http://www.wsipp.wa.gov/BenefitCost>
- ^{xxxiii} <http://www.econ.ucla.edu/people/papers/Currie/Currie14.pdf>
- ^{xxxiv} <http://www.jstor.org/discover/10.2307/3083291?uid=3739568&uid=2&uid=4&uid=3739256&sid=21102655618787>
- ^{xxxv} <http://qje.oxfordjournals.org/content/122/1/159.abstract>
- ^{xxxvi} <https://heckmanequation.org/resource/invest-in-early-childhood-development-reduce-deficits-strengthen-the-economy/>
- ^{xxxvii} <http://abc.fpg.unc.edu/>
- ^{xxxviii} <http://highscope.org/Content.asp?ContentId=219>
- ^{xxxix} www.heckmanequation.org
- ^{xl} http://www.readynation.org/uploads//20130916_ReadyNationVitalLinksLowResnoEndnotes.pdf